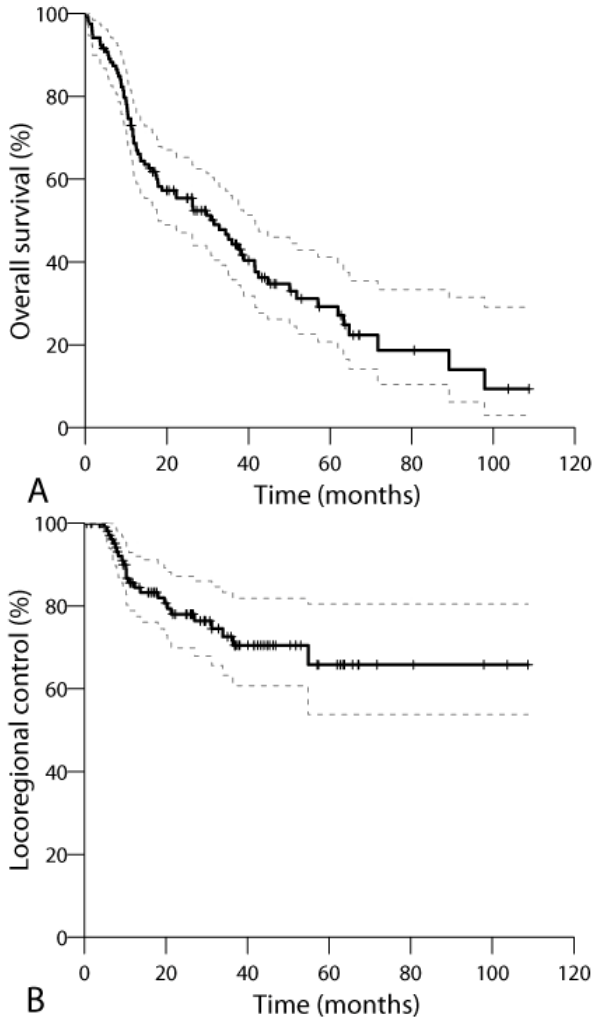


Figure 1: *A*: Overall survival. *B*: Locoregional control. Dashed lines indicate the 95% confidence intervals.

Conclusion: Radical radiotherapy is feasible and effective for elderly or unfit patients. Three-year locoregional control after radical radiotherapy using a boost technique was 72%, with low rates for late urinary and intestinal toxicity. Early and late toxicity rates were reduced by using IMRT.

PO-0760

3D Radiotherapy with concurrent weekly Gemcitabine and Cisplatin for bladder carcinoma

A. Varveris[1], J. Stratakis[2], M. Mazonakis[2], A. Spanakis[1], C. Varveris[1]
[1]*University Hospital of Heraklion, Radiotherapy, Heraklion, Greece*
[2]*University of Crete, Medical Physics, Heraklion, Greece*

Purpose or Objective: We conducted a phase I trial of Gemcitabine (GEM) with concomitant 3D-Conformal Radiotherapy (3D-CRT) and Cisplatin (CDDP) in patients with muscle-invasive bladder cancer who were ineligible for surgery or refused organ loss.

Material and Methods: 28 patients with transitional cell carcinoma, cT2(n=14), cT3(n=8), T4a(n=6), cN0-1, M0, median age 70.5 years were included after maximal transurethral resection. 3D-CRT was administered with a 18MV Linac, 1.8Gy/Fr, 5d/week up to 64.80Gy. The GEM starting dose of 40mg/m2/week was increased by 40mg/m2 increments to 2 levels (80 and 120mg/m2/week) in cohorts of 6 patients. The standard dose of CDDP was 25mg/m2/week given 2 days after GEM infusion. Both drugs were given 30 to 60min before irradiation

Results: All patients were evaluated for toxicity which was evaluated according to the Common Toxicity Criteria and the RTOG/EORTC Score. The DLTs (Dose Limiring Toxicities) were defined as hematologic grade >3 or Non-hematologic grade 3 events, as Abdominal pain/Diarrhea (Proctitis), Dysuria/Urinary frequency (Cystitis), Fatigue/Asthenia, not resolving tro grade 1/2 within 2 days or necessitating the interruption of RT for >1 week, in more than 3 of 6 patients in each cohort. The GEM dose immediately before the level at which the DLT was observed was defined as the Maximum Tolerated Dose (MTD). In 6 patients accrued to GEM dose 40mg/m2/week no grade 3 toxicities were seen. From 6 patients given 80mg/m2/week of GEM, 2 had episodes of grade 3 bladder toxicity, 3 General Weakness and 2 presented with grade 3 hematological sequelae. From 6 patients accrued to GEM dose 120mg/m2/week, 4 had episodes of grade 3 neutropenia and/or thrombocytopenia and 3 showed grade 3 fatigue/malaise. In 4 patients treatment was interrupted for more than 1 week. The 2-year locoregional failure rate was 28% (8/28). 12 of 28 (42%) patients are alive with no evidence of disease progression, 8 patients developed M1 disease and 5 died from this.

Conclusion: GEM given synchronously with 3D-CRT is well tolerated as a bladder preservation schema. The MTD was defined at 80mg/m2/week combined to CDDP and merits evaluation in phase II/III trials.

Poster: Clinical track: Skin cancer / malignant melanoma

PO-0761

Radiation therapy for angiosarcoma of the scalp: total scalp irradiation with X-rays and electrons

M. Hata[1], H. Wada[2], I. Ogino[1], M. Omura[1], I. Koike[1], Y. Tayama[1], K. Odagiri[1], T. Kasuya[1], M. Aihara[2], T. Inoue[1]
[1]*Yokohama City University Graduate School of Medicine, Department of Radiology, Yokohama, Japan*
[2]*Yokohama City University Graduate School of Medicine, Department of Dermatology, Yokohama, Japan*

Purpose or Objective: Wide surgical excision is the standard treatment for angiosarcoma of the scalp, but it is often difficult to completely excise because of the invasive nature and typical multifocal spread of the tumor. Furthermore, many patients are medically inoperable because of old age or coexisting disease. Therefore, we investigated the outcome of radiation therapy with total scalp irradiation for angiosarcoma of the scalp.

Material and Methods: Seventeen patients with angiosarcoma of the scalp underwent radiation therapy with total scalp irradiation with curative intent. Their median age at the time of irradiation was 77 (range, 57–89) years. Four of the 17 patients had tumor invasion into the deep organs, including the skull in three and the temporal muscle in one. Four patients had cervical lymph node metastases, but none had distant metastases. A median initial dose of 50 Gy in 25 fractions was delivered to the entire scalp. Two pairs of lateral X-ray and electron fields were used for total scalp irradiation: 4–6 MV X-rays were delivered through bilaterally opposed ports to the central scalp from the frontal eminence to the suboccipital region, to a depth of 10 mm inside the skull, and 5–9 MeV electrons were delivered through single ports to the bilateral temporal scalp. Subsequently, local radiation boost to the tumor sites achieved a median total dose of 70 Gy in 35 fractions.

Results: All irradiated tumors disappeared or were markedly reduced after radiation therapy; the objective response rate was 100%. However, 14 of the 17 patients developed recurrences during the median follow-up period of 14 months after radiation therapy; seven had recurrences in the scalp, including primary tumor progression in two patients and new disease in five, and 12 patients developed distant metastases. The two patients with primary tumor progression originally had tumor invasion into the skull and temporal muscle, and received a total radiation dose of 70 Gy in 35 fractions. The primary progression-free, scalp relapse-free,

and distant metastasis-free rates were 86%, 67%, and 38% at 1 year and 86%, 38%, and 16% at 3 years, respectively. Thirteen patients died; the cause of death was tumor progression in 10 patients, infectious pneumonia in two, and old age in one. The overall and cause-specific survival rates were both 73% at 1 year and 23% and 44% at 3 years, respectively. The median survival time was 16 months. Although all 17 patients developed grade 1–2 radiation dermatitis, there were no therapy-related toxicities of grade ≥3.

Conclusion: Total scalp irradiation with X-rays and electrons is safe and effective for local tumor control of angiosarcoma of the scalp, but a prophylactic dose of 50 Gy in conventional fractions may be insufficient to eradicate microscopic disease. For gross tumors, a total dose of 70 Gy, and >70 Gy for tumors with deep invasion, is recommended.

PO-0762

Dose-volume predictors of radio-induced effects after SRS for uveal melanoma

C.R. Gigliotti[1], M. Di Nicola[2], L.A. Perna[1], C. Fiorino[1], G. Modorati[2], P. Mortini[3], A. Franzin[3], A. Bolognesi[4], A. Del Vecchio[1], R. Calandrino[1]

[1]*IRCCS San Raffaele Scientific Institute, Medical Physics, Milano, Italy*

[2]*IRCCS San Raffaele Scientific Institute, Ophthalmology, Milano, Italy*

[3]*IRCCS SAN Raffaele Scientific Institute, Neurosurgery, Milano, Italy*

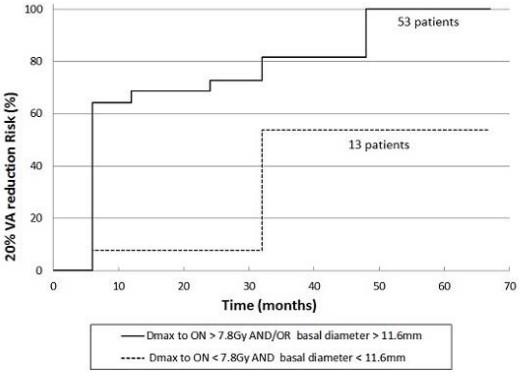
[4]*IRCCS SAN Raffaele Scientific Institute, Radiotherapy, Milano, Italy*

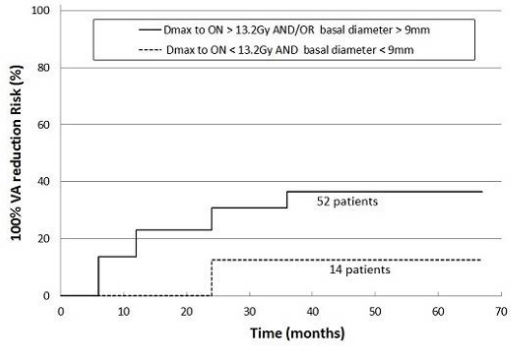
Purpose or Objective: Uveal melanoma (UM) is a life threatening intraocular malignant tumor in adults. Gamma Knife Stereotactic Radiosurgery (GKSRS) is a well assessed strategy for conservative treatment of UM providing satisfactory results in terms of survival, local control and eye preservation. Despite severe side effects following GKSRS have been reported, literature studies designed to investigate dose effect relationship of critical structures are rather poor. The aim of this work is to develop predictive models for radio induced effects in UM patients (pts) treated with GKSRS.

Material and Methods: In our institute 149 pts were treated with exclusive GKSRS for UM between 1994 and 2014. Prospectively collected clinical data are available. For 66/149 pts, 3D dosimetry data of involved critical structures could be recovered: optic nerve (ON), eyeball and posterior part of bulb. For this cohort of pts the median follow up of 2years (6 months-6 years) is available. Cox's analyses were used to identify selected clinical and dosimetric variables as independent risk factor of main side effects: cataract, radiation vasculopathy (RV), radiation papillopathy (RP) and neovascular glaucoma (NVG), visual acuity (VA) reduction > 20% of basal value (VA20%) and complete loss of basal VA (VA100%). ROC curve analysis allowed predicting cut off value of significant variables.

Results: The 2 years incidences from our data were: cataract 39%, RV 10%, RP 12%, NVG 14%, VA20% 59% and VA100% 27%. Age and sex did not result significant. Concerning cataract the volume of whole bulb receiving more than 30Gy (p=0.0004) and tumor thickness (p=0.002) resulted highly predictive; best cut off were respectively 82.2mm3 and 6.6mm. A clear relationship with maximum dose (Dmax) to ON was found for RP (p=0.009 cut off: 14.9Gy) and RV (p=0.0009 cut off: 23.8Gy). For RV, also tumor in the anterior to equator position was predictive (p=0.008). The volume of the posterior bulb receiving more than 20Gy (p=0.0003, cut off: 413.7mm3) and tumor thickness (p=0.0009 cut off: 8.7mm) were predictive for NVG. Multivariate analyses resulted in two variables predictive model both for VA20% (AUC=0.79) and for VA100% (AUC=0.83), including the tumor longest basal diameter and Dmax to the ON. The best cut off values for the tumor longest basal diameter were 11.6mm for VA20% (p=0.02) and 8.98mm for VA100% (p=0.007); the best cut off values for Dmax to the ON were 7.8Gy (p=0.045) for VA20% and 13.2Gy (p=0.002) for VA100%. A summary of the main results are reported in Figure.

	Cataract	*Neo Vascular Glaucoma*	*Radiation Vasculopathy*	*Radiation Papillopathy*	*20% Visual Acuity Reduction* (Model AUC=0.79)	*100% Visual Acuity Reduction* (Model AUC=0.83)
V30 Whole Bulb	p=0.0004 HR=1.007 95%CI: 1.003-1.011 cut-off: 82.2mm³ AUC=0.71					
Dmax Optic Nevre			p=0.0009 HR=1.2 95%CI: 1.07-1.32 cut-off: 23.8Gy AUC=0.86	p=0.009 HR=1.14 95%CI: 1.032-1.258 cut-off: 14.9Gy AUC=0.83	p=0.045 HR=1.04 95%CI: 1.00-1.08 cut-off: 7.8Gy	p=0.002 HR=1.12 95%CI: 1.04-1.21 cut-off: 13.2Gy
V20 Posterior Bulb		p=0.0003 HR=1.12 95%CI: 1.05-1.19 cut-off: 413.7mm³ AUC=0.83				
Position: anterior to equator			p=0.008 HR=0.14 95%CI: 0.04-0.60			
Tumor Longest Basal Diameter					p=0.02 HR=1.15 95%CI: 1.02-1.30 cut-off: 11.6mm	p=0.007 HR=1.36 95%CI: 1.09-1.69 cut-off: 8.98mm
Tumor Thickness	p=0.002 HR=1.35 95%CI: 1.12-1.62 cut-off: 6.6mm AUC=0.64	p=0.0009 HR=2.01 95%CI: 1.33-3.03 cut-off: 8.7mm AUC=0.83				





Conclusion: We found clinical and dosimetric variables to clearly predict the risk of the main side effects after GKSRS for UM. These results may provide new dose constraints to critical structures, that once implemented during treatment planning, could reduce radiation toxicities. Further investigation to create bulb dose surface maps highlighting any specific regions more radiosensitive are now under implementation.

PO-0763

Ruthenium-106 brachytherapy for choroidal melanoma: high efficacy with improved visual outcome.

F.P. Peters[1], M. Marinkovic[2], N. Horeweg[1], L. Sommers[1], M. Fiocco[3], J.C. Bleeker[2], M. Ketelaars[1], G.P.M. Luyten[2], C.L. Creutzberg[1]

[1]*Leiden University Medical Center, Department of Radiation Oncology, Leiden, The Netherlands*

[2]*Leiden University Medical Center, Department of Ophtalmology and Melanoma Center, Leiden, The Netherlands*

[3]*Leiden University Medical Center, Department of Biostatistics, Leiden, The Netherlands*

Purpose or Objective: Choroidal melanoma is the most frequent malignant tumour of the eye. Eye-conserving treatment with Ruthenium-106 brachytherapy (RuBT) is a standard treatment for patients with small to intermediate size melanomas. The present study was done to evaluate